

2.8 Complex Zeros & Fund. Th. of Algebra (KEY)

Remember to show your work on your assignment where necessary!

1. zeros: $x = 3i, x = -3i, f(x) = x^2 + 9$, no x-intercepts
2. zeros: $x = 1$ mult. 2, $x = 2i, x = -2i, f(x) = x^4 - 2x^3 + 5x^2 - 8x + 4$, x-int. (1, 0)
3. $f(x) = (x - 1 + 2i)(x - 1 - 2i)$, degree 2, no x-intercepts
4. $f(x) = (x - 2)(x - 3)(x - i)(x + i)$, degree 4, x-intercepts (2, 0) (3, 0)
5. $f(x) = (x + 2)(x - 1 - 2i)(x - 1 + 2i)$, degree 3, x-intercepts (-2, 0)
6. $f(x) = (x + \sqrt{3})(x - \sqrt{3})(x + 4)(x - 5 - 6i)(x - 5 + 6i)$, degree 5, x-intercepts (-4, 0) $(\sqrt{3}, 0)$ $(-\sqrt{3}, 0)$
7. $f(x) = x^5 - 2x^4 + 10x^3 - 20x^2 + 9x - 18$, degree 5, x-int. (2, 0)
8. $f(x) = x^3 - 4x^2 + 29x$, degree 3, x-int. (0, 0)
9. $f(x) = (x - 1)^2(x + 2)^3$, degree 5, x-int. (1, 0) (-2, 0)
10. $f(x) = (x - 2)^2(x - 3 - i)(x - 3 + i)$, degree 4, x-int. (2, 0)
11. $f(x) = -x^4 + 6x^3 - 9x^2$, degree 4, x-int. (0, 0) (3, 0)
- 12 – 15 on your own!
16. zeros: $x = 1, x = -\frac{1}{2} - \frac{\sqrt{19}}{2}i, x = -\frac{1}{2} + \frac{\sqrt{19}}{2}i: f(x) = (x - 1)\left(x + \frac{1}{2} - \frac{\sqrt{19}}{2}i\right)\left(x + \frac{1}{2} + \frac{\sqrt{19}}{2}i\right)$
17. zeros: $x = -2, x = 1/3, x = -\frac{1}{2} - \frac{\sqrt{3}}{2}i, x = -\frac{1}{2} + \frac{\sqrt{3}}{2}i: f(x) = (x + 2)(3x - 1)\left(x + \frac{1}{2} - \frac{\sqrt{3}}{2}i\right)\left(x + \frac{1}{2} + \frac{\sqrt{3}}{2}i\right)$
18. remaining zeros: $x = 1 - i, x = \sqrt{3}, x = -\sqrt{3}: f(x) = (x + \sqrt{3})(x - \sqrt{3})(x - 1 - i)(x - 1 + i)$
19. remaining zeros: $x = -4i, x = \sqrt{3}, x = -\sqrt{3}: f(x) = (x + \sqrt{3})(x - \sqrt{3})(x - 4i)(x + 4i)$
20. $f(x) = (x - 1)(2x^2 + x + 3)$
21. $f(x) = (x^2 + 4)(x + 1)(x - 3)$
- 22-23. On your own! Bonus: on you own!